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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,064	12/30/2003	Alexander A. Maltsev	1020.P16742	9115

57035 7590 02/15/2007	EXAMINER
KACVINSKY LLC C/O INTELLEVATE P.O. BOX 52050 MINNEAPOLIS, MN 55402	FILE, ERIN M

	ART UNIT	PAPER NUMBER
	2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/15/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

	Application No.	Applicant(s)
Office Action Summary	10/750,064	MALTSEV ET AL.
	Examiner	Art Unit	
	Erin M. File	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on _30 December 2003_.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) _1-18_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) _1-18_ is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on _30 December 2003_ is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _12/30/2003_.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2.   Claims 1-3, 7, 9, and 10 are rejected under 35 U.S.C. 102(e) as being anticipated

by Sun et al. (U.S. Pub. No. 2005/0152314).

Claim 1, Sun discloses:

- an averaging circuit adapted to provide an averaged channel estimate by

  performing a time domain averaging and frequency domain averaging on one or

  more received inputs ([0154], lines 2-6, 10-12); and

- an equalizer to equalize a received multicarrier symbol based on the averaged

  channel estimate (the channel estimate H is used to calculate the equalization

  ([0155]-[0160]).

Claim 2, Sun discloses the averaging circuit is adapted to provide an averaged channel

estimate by performing a time domain averaging and frequency domain averaging on

one or more received channel estimates ([0154], lines 2-6, 10-12).

Claim 3, Sun further discloses the averaging circuit comprises:

- a time domain averaging block adapted to perform time domain averaging on a

  plurality of received channel estimates to generate a time domain averaged

  channel estimate on a per subcarrier basis (per subcarrier, see [0156], line 9,

  [0154], lines 10-12);

- a frequency domain averaging block adapted to perform frequency domain

  averaging on a received time domain averaged channel estimate ([0154], lines 2-

  6, 10-12, the time domain averaging is taken prior to the FFT and the frequency

  domain averaging is done after the FFT).

Claim 7, Sun further discloses a coarse channel estimator to generate a coarse channel

estimate to be input to the averaging circuit ([0150]).

Claim 9, Sun further discloses the equalizer comprises an adaptive equalizer ([0156]).

Claim 10, Sun further discloses the multicarrier symbol comprises an OFDM symbol

([0110], line 5).

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.   Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sun et al.

(U.S. Pub. No. 2005/0152314) as applied to claim 3 above, and further in view of Kim et

al. (U.S. Pub. No. 2004/0125235).

Claim 4, Sun fails to disclose the frequency domain averaging block generates

frequency domain averaged channel estimates that are used to update coefficients of

the equalizer. However, Kim discloses using channel estimates to update coefficients

of the equalizer ([0021]). Because Kim discloses this method has the advantage of

reducing channel distortion ([0021], line 1), it would have been obvious to one skilled in

the art at the time of invention to in incorporate the coefficient updating as disclosed by

Sun into invention of Sun.

5.   Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sun et al.

(U.S. Pub. No. 2005/0152314) as applied to claim 3 above, and further in view of

Papathanasion (U.S. Pub. No. 2004/0142665).

Claim 5, Sun fails to disclose the time domain averaging is performed using a moving

average, however, Papathanasion discloses averaging using a moving average

([0042]). Moving averaging is well known in the art for its advantage of maintaining a

constantly updated average value. Because of this advantage, it would have been

obvious to one skilled in the art at the time of invention to incorporate the moving

average as disclosed by Papathanasion into the invention of Sun.

6.   Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sun et al.

(U.S. Pub. No. 2005/0152314) as applied to claim 3 above, and further in view of Abeta

et al. (U.S. Patent No. 6,757,272).

Claim 6, Sun fails to disclose the time domain averaging is done by block averaging,

however, Abeta discloses averaging by block averaging (col. 7, lines 57-67). Because

block averaging has the advantage in a system of being computationally efficient (i.e.

the average is not being constantly calculated), it would have been obvious to one

skilled in the art at the time of invention to incorporate the block averaging as disclosed

by Abeta into the invention of Sun.

7.   Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sun et al.

(U.S. Pub. No. 2005/0152314) as applied to claim 7 above, and further in view of

Akopian et al. (U.S. Pub. No. 2001/0110184).

Claim 8, Sun fails to disclose a coarse channel estimator to receive a symbol replica

and a received symbol to generate a coarse channel estimate, however, Akopian

discloses receive a symbol replica and a corresponding received symbol to generate a

coarse channel estimate ([0043], fig. 1A). Because Akopian discloses that this use of a

replica for coarse estimation allows for more efficient fine frequency estimation ([0005]),

it would have been obvious to one skilled in the art at the time of invention to

incorporate the coarse replica estimation as disclosed by Akopian into the invention of

Sun.

8.   Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Sun et al. (U.S. Pub. No. 2005/0152314) in view of Akopian et al. (U.S. Pub. No.

2001/0110184).

Claim 11, Sun discloses:

- ·an equalizer to equalize a received symbol based on a fine channel estimate (the

  channel estimate H is used to calculate the equalization ([0155]-[0160]);

- a mapping block to provide a replica of a transmitted symbol ([0184]);

- an averaging circuit adapted to perform time domain averaging on a plurality of

  coarse channel estimates to generate a time domain averaged channel estimate,

  and to perform frequency domain averaging on the time domain averaged

  channel estimate to generate the fine channel estimate ([0156], line 9, [0154],

  lines 2-6, 10-12, the time domain averaging is taken prior to the FFT and the

  frequency domain averaging is done after the FFT).

Sun fails to disclose a coarse channel estimator to receive a symbol replica from the

mapping block and·a corresponding received symbol, the coarse channel estimator to

generate a coarse channel estimate, however, Akopian discloses receive a symbol

replica and a corresponding received symbol to generate a coarse channel estimate

([0043], fig. 1A). Because Akopian discloses that this use of a replica for coarse

estimation allows for more efficient fine frequency estimation ([0005]), it would have

been obvious to one skilled in the art at the time of invention to incorporate the coarse

replica estimation as disclosed by Akopian into the invention of Sun.

Claim 12, Sun further discloses the averaging circuit comprises a time domain

averaging block and a frequency domain averaging block ([0154], lines 2-6, 10-12).

Claim 13, Sun further discloses the received symbol comprises a multicarrier symbol,

and the replica symbol comprises a replica of a corresponding transmitted multicarrier

symbol ([0184]).

Claim 14, Sun further discloses the multicarrier symbol comprises an OFDM symbol

([0110], line 5).

9.   Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Sun et al. (U.S. Pub. No. 2005/0152314) in view of Kim et al. (U.S. Pub. No.

2004/0125235).

Claim 15, Sun discloses:

- performing a time domain averaging on one or more received inputs to generate

    a time domain averaged channel estimate on a per subcarrier basis (per

    subcarrier, see [0156], line 9, [0154], lines 10-12);

- performing a frequency domain averaging on the time domain averaged channel

    estimate to generate a fine channel estimate ([0154], lines 2-6, 10-12, the time

    domain averaging is taken prior to the FFT and the frequency domain averaging

    is done after the FFT);

Sun fails to disclose updating equalizer coefficients based upon the channel estimate.

However, Kim discloses updating equalizer coefficients based upon the channel

estimate ([0021]). Because Kim discloses this method has the advantage of reducing

channel distortion ([0021], line 1), it would have been obvious to one skilled in the art at

the time of invention to in incorporate the coefficient updating as disclosed by Sun into

invention of Sun.

Claim 16, Sun discloses:

- generating a coarse channel estimate based on a received multicarrier symbol

  and a generated replica of the corresponding transmitted multicarrier symbol

  ([0150]);

- performing a time domain averaging on a plurality of coarse channel estimates

  on a per subcarrier basis to generate a time domain averaged channel estimate

  (per subcarrier, see [0156], line 9, [0154], lines 10-12).

10.   Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sun et

al. (U.S. Pub. No. 2005/0152314) and Kim et al. (U.S. Pub. No. 2004/0125235) as

applied to claim 16 above, and further in view of Akopian et al. (U.S. Pub. No.

2001/0110184).

Claim 17, neither Sun nor Kim discloses the generating a coarse channel estimate

comprises generating a replica of a transmitted multicarrier symbol and generating a

coarse channel estimate by dividing a received multicarrier symbol by the generated

replica of the corresponding transmitted multicarrier symbol. However, Akopian

discloses receive a symbol replica and a corresponding received symbol to generate a

coarse channel estimate ([0043], fig. 1A). Because Akopian discloses that this use of a

replica for coarse estimation allows for more efficient fine frequency estimation ([0005]),

it would have been obvious to one skilled in the art at the time of invention to

incorporate the coarse replica estimation as disclosed by Akopian into the combined

invention of Sun and Kim.

11.   Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et

al. (U.S. Pub. No. 2004/0125235) in view of Sun et al. (U.S. Pub. No. 2005/0152314).

Claim 18, Kim discloses:

- calculating an initial channel estimate based upon one or more received training

  symbols ;

- setting equalizer coefficients based upon the initial channel estimate([0024], lines

  3-5);

- and updating the equalizer coefficients based upon the averaged channel

  estimate.

Kim fails to disclose:

- performing both time domain averaging and frequency domain averaging on a

  subsequent calculated channel estimate to generate an averaged channel

  estimate;

However, Sun discloses an averaging circuit adapted to provide an averaged channel

estimate by performing a time domain averaging and frequency domain averaging on

one or more received inputs ([0154], lines 2-6, 10-12). Because averaging an

estimation is well known for its advantage in reducing errors, it would have been

obvious to one skilled in the art at the time of invention to incorporate the averaging in

the time and frequency domains as disclosed by Sun into the invention of Kim.

Claim Rejections - 35 USC § 112

12.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

13.   Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite

for failing to particularly point out and distinctly claim the subject matter which applicant

regards as the invention.

Claim 2 recites a limitation to provide time domain averaging and frequency domain

averaging on one or more received channel estimates, however, Claim 1 recites the

channel estimates are determined by averaging over the time domain and frequency

domain.   The combination of these limitations is unclear and needs clarification.

14.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Erin M. File whose telephone number is (571)272-6040.

The examiner can normally be reached on M-F 1:00PM-9:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, David Payne can be reached on (571)272-3024. The fax phone number for

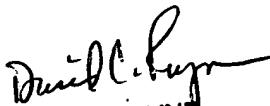the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

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For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

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Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Erin M. File

EMF
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2/9/2007

DAVID C. PAYNE
PRIMARY PATENT EXAMINER